



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/672,033	09/25/2003	Ryan Lei	42P17276	7700
8791	7590	11/22/2006	EXAMINER AHMED, SHAMIM	
BLAKELY SOKOLOFF TAYLOR & ZAFMAN 12400 WILSHIRE BOULEVARD SEVENTH FLOOR LOS ANGELES, CA 90025-1030			ART UNIT 1765	

DATE MAILED: 11/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/672,033

Applicant(s)

LEI ET AL.

Examiner

Shamim Ahmed

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 September 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8, 24 and 25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 24 and 25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 9/11/06 have been fully considered but they are not persuasive. Applicants argue that Fitzgerald does not disclose removing an additional amount of the epi germanium layer to achieve a second targeted thickness as in amended claim 1.

In response to the argument, examiner states that the argument is not persuasive because Fitzgerald teaches that prior to bonding with another substrate, the germanium layer is planarized to reduce surface roughness (paragraph 0019), which reads on the claimed limitation of **forming a targeted second thickness** by removing a predetermined amount of the germanium layer.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-8,24-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Regarding claim 1, the phrase "an amount to planarize the surface of the epitaxial germanium layer and **an additional amount**" renders the claim indefinite because it is unclear whether the additional amount is planarized from the epitaxial germanium (epi) layer or another layer in addition to the epi layer.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fitzgerald, Jr. (US 2002/00666899 A1) in view of Maleville et al (US 2004/0248379 A1).

Fitzgerald Jr. disclose a process of bonding epitaxially grown germanium (104,204) with silicon substrate, wherein a graded layer (102,202) is formed on a sacrificial silicon substrate (100,200) and the a chemical mechanical polishing is performed on the epitaxal germanium layer to reduce surface thickness after depositing any of the layers, which reads on the claimed limitation of **forming a targeted device**

layer thickness by removing a predetermined amount of the epitaxial germanium layer using chemical mechanical polishing (see paragraph 0019 and 0024-0025).

It is noted that the planarized epitaxial germanium layer prior to bonding with another substrate having a second thickness that is smaller than the thickness (which resemble the claimed first thickness) prior to the planarization step and reads on the claimed targeted second thickness.

Examiner also point out that Fitzerglad's planarized germanium layer is now reduced in thickness and meant to be use in the fabrication of predetermined or targeted device such as optoelectronic devices (paragraph 0002).

Fitzergald Jr. also teach that an oxide layer (208) is formed on a second silicon substrate (206) and the epitaxial germanium layer is bonded to the oxide layer and then the sacrificial layer is etch back to form a structure of germanium on insulation layer (see paragraph 0025 and figures 2A-2C).

Fitzergald Jr. remains silent about the activation of the germanium layer and the oxide layer.

However, in a method of bonding semiconductor structures together, Maleville et al teach that the surfaces to be bonded needs to be cleaned and activated by removing isolated particles on the wafer surfaces in order to have improved bonding between the surfaces (paragraphs 0021 and 0054, 0065).

Maleville et al also teach that the wafer surfaces are treated using oxygen plasma (paragraphs 0033).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to combine Maleville et al's teaching into Fitzgerald Jr.'s bonding process for improving the bonding between the wafer surfaces by removing contaminants and isolated particles as taught by Maleville et al.

As to claims 7-8, the thickness of the oxide layer and the amount of the germanium layer to be removed would have been obvious design choice to an ordinary skilled in the art depending of the size of the semiconductor structure to be made.

8. Claims 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fitzgerald, Jr. (US 2002/00666899 A1) in view of Maleville et al (US 2004/0248379 A1) as applied to claims 1-8 above, and further in view of Fitzgerald et al (US 2004/0072409 A1).

Modified Fitzgerald, Jr. discusses above in the paragraph 7 but remain silent regarding the particular thickness of the epitaxial germanium layer before and after the planarization or removal or polishing step.

However, Fitzgerald et al illustrates that it is desirable to achieve a germanium (Ge) device layer having a thickness of 1400 angstroms that can be achieved by removing damaged layer from the Ge layer utilizing CMP in order to have a damage-free Ge surface for device fabrication (paragraph 0034).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to employ Fitzgerald et al's teaching into modified Fitzgerald,

Art Unit: 1765

Jr.'s process for providing a desired damaged free Ge device layer during the device fabrication as taught by Fitzgerald et al.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (571) 272-1457. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on (571) 272-1465. The fax phone

Art Unit: 1765

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Shamim Ahmed
Primary Examiner
Art Unit 1765

SA
November 18, 2006